

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Doryopteris takeuchii*

COMMON NAME: No common name

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: August 2005

STATUS/ACTION

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): 1997

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act’s definition of “species.”

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Ferns and allies, Pteridaceae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Oahu

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Oahu

LAND OWNERSHIP:

The population of this plant is on public land, owned by the Federal government (National Guard) and the State of Hawaii.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Doryopteris takeuchii* is a small fern that grows in clusters. Rhizomes are compact bearing a cluster of 5 to 25 stipe bases. Fronds are 10 to 30 centimeters (3.9 to 11.8 inches (in)) long. Stipes are round, about 1 millimeter (0.04 in) in diameter, dark maroon to black and glabrous except at the very base. Blades are pale green, thick and leathery with the rachises wiry and dark maroon to black. *Doryopteris takeuchii* resembles and is closely related to *D. decora*, but differs in having a longer rachis length between the first and second pinna pairs and rachises that are usually entirely unwinged between the first and second pinna pairs, often even between the second and third pinna pairs (Palmer 2003).

Taxonomy *Doryopteris takeuchii* was originally published as *Cheilanthes takeuchii*, but was moved to the genus *Doryopteris* by W.H. Wagner (Palmer 2003). This combination is recognized by Palmer (2003), the most recent treatment of Hawaiian ferns.

Habitat Found only on Diamond Head Crater on both inner and outer dry slopes, at elevations between 100 and 120 meters (328 and 394 feet). During dry summers the fronds dry and curl up, and with winter rains the plants become green and vigorous (Palmer 2003). Habitat is disturbed

dry shrubland and grassland (M. Bruegmann, U.S. Fish and Wildlife Service, pers. comm. 1997).

Historical and Current Range/Current Status This species is known from one population totaling in the hundreds of individuals, and is found only on the island of Oahu on the slopes of Diamond Head Crater. It is suspected that this species evolved relatively recently and never had a wide historic distribution on Oahu, but the magnitude of the threats facing the species has increased dramatically (M. Bruegmann, pers. comm. 1997).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.
None known.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

This species may be adversely affected by hikers. Diamond Head Crater is a popular spot for tour groups and hikers. Individuals hiking off established trails could potentially trample plants or contribute to erosion of the steep hillsides where the plants are found. The site has relatively limited access, as it is under the jurisdiction of the Hawaii Army National Guard (M. Bruegmann, pers. comm. 1997)

C. Disease or predation.

None known.

D. The inadequacy of existing regulatory mechanisms.

There is no Federal or State protection for this taxon.

E. Other natural or manmade factors affecting its continued existence.

Fires and alien plant species are the major imminent threats to this species. Although the exact pest species that threaten this species have not been provided by the experts, alien pest plants are found throughout Diamond Head Crater where this species occurs (Charles Lamoureux, Lyon Arboretum and David Lorence, National Tropical Botanical Garden, pers. comms. 1996). With only one known population, potential extinction due to stochastic events, such as landslides and hurricanes, is a major threat.

The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al.* 1998) indicate nonnative plant species may outcompete native plants similar to *Doryopteris takeuchii*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al.* 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or

altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al.* 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to habitat of *Doryopteris takeuchii*, the Service believes nonnative plant species are a threat to *Doryopteris takeuchii*. The remaining unmanaged populations of *Doryopteris takeuchii* are still impacted by this threat.

Because Hawaiian plants were subjected to fire during their evolution only in areas of volcanic activity and from occasional lightning strikes, they are not adapted to recurring fire regimes and do not quickly recover following a fire. Alien plants are often better adapted to fire than native plant species, and some fire-adapted grasses have become widespread in Hawaii. Native shrubland and dry forest can thus be converted to land dominated by alien grasses. The presence of such species in Hawaiian ecosystems greatly increases the intensity, extent, and frequency of fire, especially during drier months or drought. Fire-adapted alien plant taxa can reestablish in a burned area, resulting in a reduction in the amount of native vegetation after each fire. Fire can destroy dormant seeds as well as plants, even in steep or inaccessible areas. Fires may result from natural causes, or they may be accidentally or purposely started by humans (Cuddihy and Stone 1990). No known conservation measures have been implemented to date to address the threats from fire and potential extinction due to stochastic events, such as landslides and hurricanes.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

None known.

SUMMARY OF THREATS

The major threats to this species include nonnative plant species and fire, which are believed to be a major cause of the decline of this species throughout its range. In addition, *Doryopteris takeuchii* is threatened by potential extinction due to stochastic events, such as landslides and hurricanes. No conservation efforts have been initiated to date.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
	Non-imminent	Subspecies/population	3
		Monotypic genus	4
		Species	5
Moderate to Low	Imminent	Subspecies/population	6
		Monotypic genus	7
		Species	8
	Non-imminent	Subspecies/population	9
		Monotypic genus	10

		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

This species is highly threatened by fire that degrades and/or destroys habitat, and nonnative plants that compete for light and nutrients. Potential threats to *Doryopteris takeuchii* include human trampling and erosion of its steep hillside habitat. Threats to the dry shrubland habitat of *Doryopteris takeuchii* and to individuals of this species occur throughout its range, and are expected to continue or increase without their control or eradication. No conservation efforts have been initiated to date.

Imminence:

Threats to *Doryopteris takeuchii* from nonnative plants, fire, trampling, and erosion are imminent because they are ongoing.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *Doryopteris takeuchii* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:

Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and was updated by personal communication with the late Warren H. Wagner of the University of Michigan, who identified this species as rare. We have incorporated additional information on this species from our files and *Hawaii's Ferns and Fern Allies* (Palmer 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art C. Medeiros III, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, the National Tropical Botanical Garden. No new information was provided by these individuals and they were not able to clarify the current status of these plants in 2004. In 2005 we contacted the species experts listed below, but received no new information on this taxon.

Species experts were contacted but did not provide new information this year, no new literature was found, and no known entities are studying this species. However, it is highly likely that the previously reported threats continue to impact the species at the same or an increased level.

COORDINATION WITH STATES:

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	March 29, 2005	National Tropical Botanical Garden
9. Ken Wood	August 2, 2005	National Tropical Botanical Garden
10. Marie Brueggmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

Other resources utilized:

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai'i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.

Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.

Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvenscens* DC (Melastomataceae) in the

- Hawaiian Islands. Bishop Mus. Occas. Pap.48: 23-36.
- Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. *American Fern Journal* 82: 27-33.
- Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvescens* D.C. (Melastomataceae). *Journal of Biogeography* 23: 775-781.
- Palmer, Daniel D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu. 324 pp.
- Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. *Endangered Species Bulletin*. November/December
- Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. *Studies in Avian Biology* 9: 1-429. Cooper Ornithological Society, Los Angeles.
- Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai'i. *Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park*, pp. 274-288.
- Smith, C.W. 1985. Impact of alien plants on Hawai'i's native biota: *in* Stone, C.P., and J.M. Scott (eds.), *Hawai'i's terrestrial ecosystems: preservation and management*. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.
- Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnaneck, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. *New Zealand Journal of Ecology* 21(1): 1-16.
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. *Manual of the Flowering Plants of Hawai'i*, Bishop Mus. Spec. Publ. 97:1-1918. University of Hawaii Press and Bishop Museum Press, Honolulu.
- Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: **Acting** David W. Winkler 11/10/05
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005
Conducted by: Marie M. Brueggmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 21, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 13, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 13, 2005
Field Supervisor